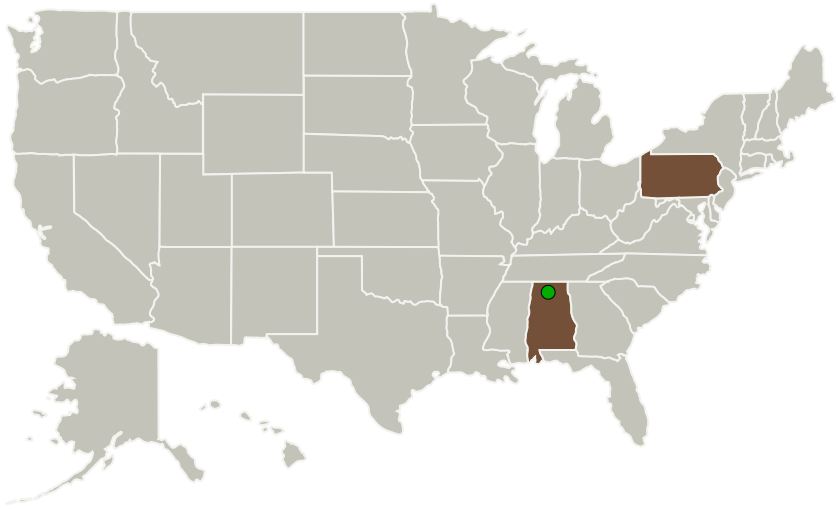
Vapor Chamber with Phase Change Material-Based Wick Structure for Thermal Control of Manned Spacecraft, Phase II

Completed Technology Project (2015 - 2017)

Project Introduction

During a NASA Phase I SBIR program, ACT addressed the need for light-weight, non-venting PCM heat storage devices by successfully demonstrating proof-of-concept of a vapor chamber with a PCM-based wick structure. The principal objective of the Phase II program is to design, fabricate, and test a full-scale PCM vapor chamber. Goals of the Phase II program include establishing thermal and structural design requirements. ACT will also develop a thermal storage model for integration into the heat transport model developed in Phase I. A custom microPCM will be developed and screened with the assistance of subcontractor SwRI to obtain optimum properties for thermal performance. ACT will also design, fabricate and test a sub-scale PCM vapor chamber with relevant form factor and a fraction of the full-scale heat load. Upon successful demonstration of the sub-scale unit, two full-scale PCM vapor chambers will be fabricated and tested. Both full-scale units will undergo extensive thermal performance testing. At the end of the Phase II project, one of the full-scale PCM vapor chambers will be delivered to NASA for further testing, and the other will remain at ACT for extended life testing.

Primary U.S. Work Locations and Key Partners



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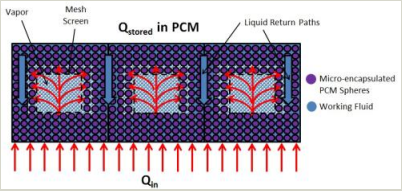
Organizations Performing Work	Role	Type	Location
Advanced Cooling Technologies, Inc.	Lead Organization	Industry	Lancaster, Pennsylvania
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Pennsylvania

Images



Briefing Chart
Vapor Chamber with Phase Change Material-Based Wick Structure for Thermal Control of Manned Spacecraft Briefing Chart *(https://techport.nasa.gov/image/130175)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Advanced Cooling Technologies, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Calin Tarau

Co-Investigator:
Calin Tarau

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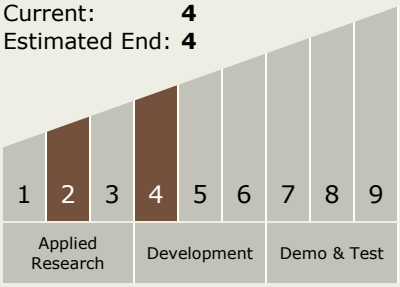
Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System